

## PROTECTION OF WILD (PLANT) LIFE

K. S. SRINIVASAN

Curator, Industrial Section, Indian Museum,  
Botanical Survey of India,  
Calcutta

From time immemorial, the destruction of virgin forests through human interferences has been evident. Our history reveals us that throughout the ages down to the present times, the activities of man in finding his shelter or food led to a consequential devastation of forests. The Aryans who migrated into India about the middle of the second millennium B.C., were essentially an agricultural and pastoral people. They cleared away the dense forests in the areas in which they settled down in order to obtain land for the cultivation of crops and to graze their cattle. Successive invasions of various other tribes of peoples for centuries had further resulted in greater and greater devastation of the forests in India. Such invasions had resulted also in driving back into the forests and mountains the earlier settlers who then practised shifting cultivation in the new terrains occupied by them, on further clearing and burning of the original dense forests. Deflagration of forests over extensive areas were also not unknown in history. We have a classical example of this in the great epic of Mahabharata, in reference to the Khandava Forest, which then existed between the Ganges and the Jumna Rivers.

Exploitation of timber and wood had also played a role in the destruction of our forests to a considerable extent in the earlier days. Timber from India is known to have been exported in very large quantities to Arabia and Persia, even long before the advent of the British Rule in India. It is known that with the very first sea-trade with India, *Sandal-wood* was carried away from South India to Palestine. In the early days, the Arabs had a very powerful fleet, and they largely depended on the *Teak-wood* for its construction. The demand on Indian timber and wood for such and similar purposes, naturally resulted in establishing a regular export of these merchandise, and the principal among such commodities were *Sandal-wood*, *Teak*, *Satin-wood*, and *Black-wood*.

The growing demands on Indian timbers had the natural depletory effects on the forests of our country. There was, perhaps, soon a realisation for the necessity to regulate the felling of trees for timber. Before the British occupation of India, the rulers at the time claimed the ownership of forests and waste-lands of the regions under their sway. Certain species of trees were considered as the prerogatives of the Rulers, and such trees were proclaimed as *Royal Trees*. In South India,

*Teak* and *Sandal-wood* were the monopoly of the Rulers. Similarly in Burma, *Teak* was a Royal Tree. The felling of such Royal trees were forbidden without permission. But even with such regulations, there had apparently been no effective and serious protection, as tracts of forests of such trees were sold for nominal values. While this was the position of even the Royal Trees, other trees were free to indiscriminate destruction.

To the British Government, ship-building became one of the major activities during the early 17th Century. The American forests, which possessed inexhaustible raw materials for Navy-building and military equipments, became a source of lumber-masts and timbers. It is seen that even in the first quarter of the 17th century, a cargo of timber went from America to England. To regulate a continuous flow of timber, a policy known as the *Broad Arrow Policy* was adopted in 1691, which stipulated that trees of particular specifications alone were permitted to be cut under strict license from the Crown.

During the latter part of the 18th Century, when the Civil administration of India with greater parts of the Presidencies of Madras, Bombay, Lower Bengal and N.W. Provinces were in British hands or under their influence, the British Admiralty had to seriously direct their attention on securing large supplies of *Teak* from India in the event of *Oak-timber* hitherto supplying the needs of their fleet-construction becoming scarce. The appointment of the Bengal-Bombay Joint Commission in about 1800 and the Despatch from the Court of Directors in 1805 to enquire into the prospecting and at the same time protecting *Teak* from total ruin and disappearance in Malabar, brought forest management and forest conservation to the fore-front, resulting in the first appointment of a Conservator of Forests in India in 1806 and assigning that post to Capt. Watson, a police officer. Nearly four decades after, Mr. Conolly, the then Collector of Malabar drew up the first set of rules for the working and protection of Forests. These rules came out to be the basis and foundation of the codes and regulations of the Forest Service which has grown up in India since 1843. This period saw the effective change over from the earlier indiscriminate exploitation of forests leading up to destruction of their resources, to a subsequent prudent utilisation attended with conservation. In 1843, in Madras a proclamation was issued to the effect that five valuable

kinds of Timbers, viz., *Teak*, *Pun*, *Black-wood*, *Jack*, and *Sandal-wood* should be preserved in Government forests. Subsequently, when the administration of India by the British through the double Government of the Crown and the East India Company terminated in 1858, with the Royal Proclamation declaring Sovereignty of Queen Victoria as Empress of India, the conservation of Forests assumed greater and greater importance, with vigorous implementations of these policies throughout India and Burma, providing protection against injurious and irregular felling, jungle fires and destruction of forests through artificial and natural causes etc. In these endeavours, several names have become closely associated with the history of our Indian Forestry, and the most distinguished among them being Cleghorn, designated as founder of Forest Conservancy in India, Gibson, Hamilton, Dalzell, Wallich, Falconer, Brandis and Beddome.

Ultimately an Act entitled the Indian Forest Act VII of 1865 was promulgated which came into operation on the 1st May, 1865, which *inter alia* provided for preservation of all growing trees, shrubs and plants within Government Forests or of certain kinds only. The Acts, rules and regulations relating to Forestry have since been amended and amplified from time to time according to the needs of the States and Provinces.

From the fore-going it would be evident that the economic and utilisation aspects had influenced the concept of conservation and protection of forest resources in our country. The purely scientific aspect as opposed to the economic aspect, appears to have received neither importance nor attention hitherto. In many countries in the world comprehensive federal laws have been passed for the protection of wild-life; and it would be interesting to mention here that even as far back as 1475, in Italy, the Venetian Council passed a law whereby the mountain forests were protected by judicious legislation. In recent years, several States and Provinces in the world have their own specific laws for protection of individual species even from a purely scientific angle. Thus the bulbous plants of unique endemic species are protected by regulations in Israel; the indigenous wild plants and flowers of Natal are protected; so also the native flora in Transval is protected by special ordinance. *Agathis australis* or the *Kauri Pine* is protected in New Zealand. Similarly Yugoslavia, Sweden, Netherlands, Germany, Denmark, Finland, Austria, Belgium, Japan and other countries have special laws for the protection of several plant species, including herbaceous species or particular plant communities of essential interest from a scientific or educational point of view or even from a point of view of preservation of beautiful scenery.

In the back ground of nature protection, as applied to particular species or communities of plants, from purely scientific and educational point of view, as

obtained in other progressive countries, the urgent need for similar concepts in respect of Indian flora, would receive a proper perspective. In the present article, therefore, some suggestions are offered, illustrative of the lines of nature conservancy that may receive the attention with advantage to aid scientific progress.

The idea of suitable measures for conservation of selected plant species is really a laudable one. But when viewed from the practical side, one is confronted with many problems. It is true that there are legislations for protection of Wild animal life, and in India we have such Acts as the Bombay Wild Animals and Wild Birds Protection Act of 1950, India Wild-Life Board Regulations, etc., Indian Forest Act and so on and so forth. Such Acts have been promulgated obviously based on some authentic statistical data, or on the application of certain standards. The same principles, even if applied *mutatis mutandis* with plant species, may not seem tenable. To say that a lion has to be protected because it is a noble and graceful animal and its population within its restricted confines of the Gir Forests, is fast depleting, is easily understandable. Here of course the rarity of the species, coupled with the localised distribution have come to be the basic factors necessitating protection of such Wild-Life. Similarly the case of many of the animals that have come under the ambit of laws affording protection for Wild-Life, can easily be understood (*vide* the recent report of the Ceylon Wild-Life Board authorities on the need for protection of Wild-elephants in Ceylon). But in the case of plants in general, it is not so easy to make such selections. To say merely that "rare plants have to be protected" would simply be meaningless, unless it is precisely defined as to what would constitute such rare plants, and by what authentic standards their rarity is actually evaluated. Some may say that *Orchids* may be protected, but then why? With so many genera and with so many species within each genus and so wide a distribution and with no precise statistical data of the number of each kind growing, and the number actually disturbed from their natural habitat, resulting in the possibility of that particular species in course of time being relegated to the category of "rare species" and thus necessitating protection, it will be really not quite rational to predict anything about any species precisely. The approach to the problem has therefore necessarily to be slightly different from the normal or more usual concepts.

#### The Status of the Economic Species

In respect of the important capital goods, which are of economic value, there are sufficient safe-guards. For example the Indian Tea Control (1938) (viii of 1938) stipulates Indian Tea Control Rules. So also for cotton, we have Cotton Textiles (Control) Order of 1948, Cotton Textiles (Control of movement) Order of 1948, Cotton Textiles (Export Control) Order of 1949 and so on, and

## PROTECTION OF WILD (PLANT) LIFE

even Draft Indian Standard Codes for Pickers have been formulated. Also the several Trade Notices issued under the authority of Government impose restrictions on exploitations of commercial commodities. It is known that export of many species of hard-wood timbers were and are in some cases still prohibited or regulated, such as *Sal*, *Dalbergia sisso*, *Pterocarpus marsupium*, *Adina cordifolia*, *Xylia xylocarpa*, *Mesua ferrea*, *Salmalia*, *Terminalia chebula*, *Phoebe*, *Calophyllum tomentosum* etc. Many of the timber trees of our Forests are thus sufficiently protected through relevant regulations, and as such it may not be our concern to deal with such species, as not coming within the scope of the present problem.

The same may also seem true of several other commodities as *oil-seeds*, *spices*, *sugar*, *medicinal products or drugs* and *herbs*, *dyes* and *tan materials* as barks etc. *cutch* and *gambiers*, *gums* and *resins*, and other materials too many to recapitulate here, which are governed by certain regulations, or whose trade returns for years together in the past have not indicated any jeopardy. Placing of any restriction on the collection of plants or their parts for purposes of Botanical or academic interest only might not only tend to seriously affect the internal revenues to the State, but also the International Trade relationships, so vital in the economy of any State. In imposing any restriction, therefore, greatest discretion has to be shown.

### Endemic or Apparently Endemic Species

The endemic species are of very great biological interest and importance. They also have a very great phyto-geographical importance. Instances are known where within particular genera, the endemic species have either wide range of affinities outside the area of occurrence of the endemic species themselves or restricted to their native domain. In cases, endemic genera have been even correlated with geological time and physiographic features. Endemic flora also throw considerable light on the operations of agencies of dissemination and the like, and the migrations of flora through the continents. Endemism lends also much evidence for the cause of huge speciations, representing evolution from a few arche-types and so on. The importance of *Endemic-flora* is thus undoubtedly great and therefore there would be much force in advocating for the preservation of such species.

It has to be mentioned here, that in the light of our present knowledge of the Flora of the Indian Peninsula, it may not be safe to predict with certainty of the positive Endemic-flora of our country. However, such species which are so far known to be endemic, or apparently endemic, may be included in the category, till science proves it otherwise. Some species may occur perhaps in abundance at a particular area, but still as the species is endemic and restricted to that locality only, it would

be necessary to include them also, e.g. *Lavatera kashmiriana* Camb.

The following species may deserve consideration:—

*Aconitum kashmiricum* Stapf.  
*Aconitum moschatum* Stapf.  
*Allardia vestita* Hk.f. & T.  
*Allium clarkei* Hk.f.  
*Allium consanguineum* Kunth.  
*Allium loratum* Baker.  
*Allium thomsonii* Baker.  
*Anemone tetrasepala* Royle.  
*Aquilegia vulgaris* Linn. var. *jucunda* Hk.f. & T.  
*Artemisia amygdalina* Dcne.  
*Astragalus bicuspidis* Fisch.  
*Astragalus falconeri* Bunge.  
*Astragalus gracilipes* Benth.  
*Astragalus longicaulis* Baker.  
*Astragalus malacophyllus* Benth.  
*Astragalus oxyodon* Baker.  
*Carduus thomsoni* Hk.f.  
*Dianthus cachemiricus* Edgew.  
*Dianthus Jacquemontii* Edgew.  
*Erysimum melicentae* Dunn.  
*Epipogon tuberosum* Duthie.  
*Gentiana cachemirica* Dcne.  
*Gentiana kurroo* Royle.  
*Hedysarum cachemirianum* Benth.  
*Iris aurea* Lindl.  
*Iris gilgitensis* Baker.  
*Iris spuria* Linn. var. *notha*, Baker.  
*Lavatera kashmiriana* Camb.  
*Lespedeza elegans* Camb.  
*Mertensia moltkioides* Clarke.  
*Pleurospermum stylosum* Clarke.  
*Potentilla clarkei* Hk.f.  
*Potentilla kashmirica* Hk.f.  
*Potentilla curviseta* Hk.f.  
*Primula reptans* Hk.f.  
*Salvia hians* Royle.  
*Saussurea clarkei* Hk.f.  
*Saussurea elliptica* Clarke  
*Saussurea glanduligera* Schultz.  
*Saussurea lappa* Clarke.  
*Saussurea schultzii* Hk.f.  
*Senecio Jacquemontianus* Benth.  
*Senecio thomsoni* Clarke  
*Swertia thomsoni* Clarke  
*Tanacetum artemisioides* Schultz.  
*Tanacetum falconeri* Hk.f.  
*Valeriana elegans* Clarke.  
*Viola falconeri* Hk.f. & T.

### Mono-type Indian Representative of a Particular Genus

While it is common that a particular genus has quite a large number or fair representative of species to re-

present the particular group, occasionally however, instances are met where there exists only one Indian species of a particular genus, even though that genus itself may have wider range of distribution. This, quite apart from local floristic interest, has significance in the plant-geography, dispersion and evolution. Because of the high scientific interest, they would seem to deserve conservation. As an example of this category may be mentioned *Iberidella andersoni* Hk.f. & T. Though not strictly coming under this category, *Meconopsis aculeata* Royle, the beautiful Blue-Poppy of the Western Himalayas, the only species occurring in Kashmir Valley, may be added. In general, the marine algae throughout the Indian Coast may be brought under regulations, imposing selective collection only in very minor quantities for study and prohibiting altogether large-scale collection for exportation or otherwise for commercial purposes.

#### Indian Type-species at Their Place of Origin

Several new species are described on the original collections made from particular localities, and the description of the new species or new genera, discovered, leads on to the preservation of the original collection on which the description is based as the Type-specimens. It would seem worthwhile to preserve not only the "Type-specimens" in their *post obitum* stage as herbarium specimens, but also the species themselves, in their first place of discovery. This would not perhaps be feasible in every case, but at least it should prove possible with certain instances. Such discrimination would prove of high scientific interest, as affording ample opportunities for Plant-geographers, Biologists and Botanists to study and understand the trend of evolutionary tendencies and the reaction and location of highly progressive biological phenomena occurring in plant life as leading up to speciation, mutations, polyploidy, etc. etc. The data and the empirical formula that can be constructed out of these field observations and study would be of considerable value even from the point of view of phylogeny. The list would be rather too long. But the purpose can be served by having a rational and discrete selection on a more or less regional basis.

#### Species that are Indiscriminately Destroyed or Exploited without Corresponding Chances for Rejuvenation or Rehabilitation

There are quite a number of plants which are priced and collected for cultivation or otherwise, to satisfy the aesthetic pleasures. Common ones are the numerous species of orchids. It will be of interest to know that such species as *Aerides odoratum* Lour., *Doritis taenialis* Benth. (= *Aerides taeniale* Lindl.) and *Aerides maculosum* Lindl. are much priced as cultivated forms. Suitable measures will have to be evolved to protect such species,

in case of possible elimination caused by over-enthusiastic activities inspired by aesthetic considerations.

#### Plants, Constituting State Monopolies or Under Govt. Control

There are a few plants (trees) which in particular States are governed by regulations and the export or transportation of which outside the jurisdiction of the State is strictly under State rules. For example, the root of *Saussurea lappa* Clarke, already known as a valuable economic product, known popularly as *Kuth Roots* in Kashmir State, is a State monopoly. There are special regulations which prohibit persons from freely exporting any portion of *kuth* plant from Kashmir territory. Similarly also, in the Travancore State, the transportation of *jack-fruits* is regulated. The increasing importance of *Rauwolfia serpentina* Benth. in more recent times would point to enforcing restrictions. It is known that there exists already some restrictions.

In cases of some plants (trees), there are already control exercised by proper authorities. Thus the felling of trees of *Pterocarpus santalinus* Linn. for the dye extracts, and the *Sandal-wood* for oil etc. are under strict Government control. Relaxation of these may be prevented in such circumstances.

#### Insectivorous Plants

This group would surely merit real consideration, because of various factors. The antiquity of the insectivorous plants is perhaps known to many. The group *Nepenthes* is of considerable interest from the point of view of plant migrations through ages. These groups of plants, quite apart from being interesting in their biological aspects, are also very interesting from the point of view of conservation, as they are seen with restricted distribution only in India. We may particularly mention here of *Nepenthes khasiana* Hk.f. and *Dischidia rafflesiana* Wall. in Garo Hills.

#### Himalayan Plants Reckoned as Evolved State of Foreign Species

In the Himalayas, several species of *Primulas* are represented and at least more than 40 species are expected to be found. The Geographical Distribution of *Primulas* is chiefly N. Temperate and Alpine. It is believed that the various species in the Himalayas are but highly developed states of European and North Asiatic ones. Being so, their interest is considerable from various angles. Some regulations for *Primulas* would, therefore, seem highly desirable.

#### Species Rare or with Limited Distribution, in India but Their Congeners Having Very Wide Distribution

Under this can be included such species as *Aconitum uncinatum* Linn., *Aconitum luridum* Hk.f. & T., *Aconitum moschatum* Stapf., *Aconitum kashmiricum*

Stapf., *Artemisia amygdalina* Dcne., *Saussurea glanduligera* Schutz. etc. Of course, the term "rare" has to be used with some reserve only, especially in the context of our present day knowledge of the flora of the entire peninsula. However, some species would seem deserve consideration because of their phytogeographical and distributional interest. Here may be mentioned such species as *Schizaea dichotoma* SW., *Anemia tomentosa* SW., *Asplenium auritum* SW. etc. To these may also be added such species which have very limited or restricted distribution in India, or rather occurring in smaller numbers in isolated places, but far away from one another. To this group may be added such plants as *Psilotum triquetrum* Linn., *Isoetes* spp., *Ophioglossum pendulum* Linn., *Helminthostachys zeylanica* Linn., *Olendra musifolia* Kunze., *Alsophila andersoni* J. Scott., *Alsophila albosetacea* Bedd., *Woodsia hyperborea* Br., *Asplenium auritum* SW., *Phecopteris vulgaris* Mert., and *Marattia fraxinea* Smith.

Their interest and value would be appreciated when it is noticed, that they are rather rare in India, while the species have such wide distribution as throughout Tropical America, West Indies, Australia, Mascarene Polynesia, Philippines (e.g. *Schizaea dichotoma* SW., *Asplenium auritum* SW.), N.E. Asia, America, Caucasus, Japan (*Phecopteris vulgaris* Mert.); all around the world in Tropics and a little beyond the S. Zone (*Marattia fraxinea* Smith), Mexico, Peru, West Indies etc. (*Anemia tomentosa* SW.), Malaya, Polynesia, Mauritius, Australia, Philippines (*Ophioglossum pendulum* Linn.).

#### Useful Economic Species

Some species, even well known for their high economic value, are not available in quantities for commercial exploitation. For these, imports have to be depended on. For example, *Patchouli* (*Pogostemon heyneanus* Benth. Syn: *Pogostemon patchouli* Polle) leaves are highly esteemed for the essential oil. Measures are required to grow extensively such plants. *Cloves* would also require improvement.

#### Local Species and Importation of the same to augment supplies and demands

Under this would possibly come such species as

*Acorus calamus* Linn., *Alpinia galanga* SW. etc. Though common in Manipur, Naga Hills and other places, they are imported into Bombay for the aromatic rhizomes, which are medicinal. Similarly the greater and lesser galangal, which are well-known specifics as Nervic tonic used to be imported from China, Hongkong, Straits Settlements, etc. In all these cases, proper use of the local produce, with measures to extend their areas of growth would naturally be the desideratum, as otherwise, the local produce by their disuse or neglect is liable to be affected in many ways.

The plant kingdom is really very large, comprising of from the lowly organised and microscopic non-flowering plants to the highly evolved ones, with a variety of species, with all complexities. For the preservation of the plant species discretion cannot be exercised, at least with ease and comfort as in the case of animals. From the trade returns available of such of the species as are actually coming under purview of commerce, it is difficult to speak of "rarity" for conservation purposes. When this field of commerce is left out, the plants coming under purview of conservation would naturally have only a Botanical bias, with academic or scientific interest. The groups being also so wide, and our knowledge of the extent of the flora being also far from complete or even inaccurate, it would not be safe to venture to offer positive information. They can, therefore, be only conjectural. From the science point of view, some suggestions are given, as various species having various aspects of importance or interest. Unless there is a perfect method of educating the people of what species as coming under any regulations, the working plan may offer great difficulties. A lion, a tiger, a deer, or a rhino is widely and popularly known and not necessarily through the rigours of education, but by selective intuition; but an Ephedra, Gnetum, or Catleya will not be recognised or distinguished, even by the well-informed. Thus in wild-life preservation, the animal world enjoys a distinctly favourable position. Even then, what measures will there be for checking any infringement of any rule that may be framed? All these are sure headaches; but if some tangible result could come out of the endeavours, the purpose of saving the plants to posterity would surely be served.